

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD
WATER AND SEDIMENT CONTROL BASIN
(no.)
CODE 638

DEFINITION

An earth embankment or a combination ridge and channel generally constructed across the slope and minor watercourses to form a sediment trap and water detention basin.

PURPOSE

A water and sediment control basin may be established to:

- Improve farmability of sloping land
- Reduce watercourse and gully erosion
- Trap sediment
- Reduce and manage onsite and downstream runoff
- Improve downstream water quality

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to sites where:

1. The topography is generally irregular.
2. Watercourse or gully erosion is a problem.
3. Sheet and rill erosion is controlled by other conservation practices.
4. Runoff and sediment damage land and improvements.
5. Soil and site conditions are suitable.
6. Adequate outlets can be provided.

Water and sediment control basins shall not be used in place of terraces. Where a ridge and/or channel extend beyond the detention basin or level embankment, standards for **Terrace** (Code 600) or **Diversion** (Code 362) must be applied as appropriate.

CRITERIA**General Criteria Applicable To All Purposes**

Resource management systems *may include one or more water and sediment control basins spaced throughout a field which reduce soil loss in the interval above and below the basins to prevent excessive maintenance and operation problems.*

Where land ownership or physical conditions preclude treatment of the upper portion of a slope, a water and sediment control basin may be used to separate this area from, and permit treatment of the lower slope.

The design must limit inundation, infiltration, and seepage to prevent crop damage and/or other problems. *The uncontrolled drainage area contributing to a water and sediment control basin shall not exceed 20 acres.*

Laws and Regulations

This practice must conform to all federal, state, and local laws and regulations. Laws and regulations of particular concern include those involving water rights, dam construction, land use, pollution control, property easements, wetlands, preservation of cultural resources, and endangered species.

Spacing

Water and sediment control basins must generally be spaced at terrace intervals (see standard for **Terrace** (Code 600)). Adjust spacing or include other measures needed to prevent erosion in the watercourse between basins.

The system of basins and row arrangements must be parallel and spaced to accommodate farm machinery where needed to fit row crop spacing.

Spacing design must consider embankment slope lengths, top width, and outlet location.

Cross section

For portions of the basin controlling only flowing water 3 feet or less deep, embankment slopes must be two horizontal to one vertical, or flatter. For all other portions of the basin, the sum of the upstream and downstream slopes must be 5:1 or flatter with a maximum of 2:1 in either slope. Slopes may be vegetated or flattened to permit cropping.

Earth Embankment

Minimum effective top widths are given in Table 1. Constructed embankment height must be at least 5% greater than design height to allow for settlement. The maximum settled height of the embankment must be 15 feet or less measured from natural ground at centerline of the embankment.

Table 1. Minimum Top Width of Embankments

Fill Height (feet)	Effective Top Width (feet)
0 – 5	3
5 - 10	6
10 –15	8

Foundation cutoff and seepage control

Portions of basin ridges designed to impound more than a 3-foot depth of water must include foundation cutoff and seepage control as required by the standard for **Pond** (Code 378).

Capacity

Basins must have capacity to prevent overtopping by runoff from a 10-year frequency, 24-hour duration storm. Larger design storms may be used where needed for flood control or other purposes.

In addition to the above storage, basins must have capacity to store at least the anticipated 10-year sediment accumulation, or periodic sediment removal must be provided to maintain the required capacity.

Basin ends must be closed to an elevation that will contain design capacity. *If the storage versus discharge curves in the Hawaii Supplement to the Engineering Field Handbook (EFH), Part 650, Chapter 8, show an emergency spillway is needed, a maximum of 1 foot of freeboard may be added to the design height to provide for an emergency spillway around one or both ends of the basin.* Auxiliary spillways must not contribute runoff to a lower basin (or pond) except where the lower basin (or pond) *has an emergency spillway* and is designed to control the flow.

For basins with underground outlets, the minimum storage volume and discharge may be obtained from curves shown in the Hawaii Supplement to the Engineering Field Handbook (EFH), Part 650, Chapter 8. The maximum discharge capacity used to compute storage requirement shall be 1.00 cfs per acre.

Water and sediment control basins using vertical drains or soil infiltration as outlets shall have the capacity to store 80 percent of the runoff from a 10-year, 24-hour storm. This storage capacity may be reduced if the discharge capacity of the vertical drains can be documented.

Outlets

Water and sediment control basins must have spillways, underground outlets or soil infiltration outlets that conform to standards for **Pond** (Code 378), **Grassed Waterway** (Code 412), **Diversion** (Code 362) **Underground Outlet** (Code 620), or **Vertical Drain** (Code 630) as appropriate.

Soil infiltration may be used if it will permit draining the design storm from the basin in a period such that growing crops will not be significantly damaged by standing water. Soil infiltration outlets should be limited to soils in hydrologic soil groups A and A-1. Hydrologic soil groups can be found in the Engineering Field Handbook (EFH), Part 650, Chapter 2.

Topsoil

Where necessary to restore or maintain productivity, topsoil must be stockpiled and spread over disturbed areas.

Vegetation

Disturbed areas that are not cropped must be established to appropriate vegetation or otherwise protected from erosion using organic or gravel mulch or other measures.

Selection of vegetation species must consider environmental quantity and quality, endangered species needs, and wildlife food

and habitat needs. Seedbed preparation, fertilizing, seeding, and mulching must be in accordance with standards for **Critical Area Planting** (Code 342) and **Mulching** (Code 484).

Where it may not be practical to establish to grass on the steep slopes of basin ridges in fields with multiple-year crops such as pineapple, sugarcane, and orchards that provide canopy cover, nonvegetative means such as mulches or gravel may be used.

CONSIDERATIONS

Water and sediment control basins should be part of a resource management plan including such practices as terraces, grassed waterways, contouring, a conservation cropping system, conservation tillage, and crop residue management.

Where possible, the basin should be configured to enhance sediment deposition. This can be accomplished by using flow deflectors, inlet and outlet selection, and by adjusting the length to width ratio.

For cropped fields, embankment orientation and crop row direction should be approximately perpendicular to the land slope to support contour farming. The design should support farmability by limiting short point rows or sharp curves. Field boundaries and row lengths should also be considered in planning basin location and row direction

Effects on streams and wetlands must be considered. Mitigation may be required where water is diverted or degraded for downstream uses.

This practice can be used to develop/enhance seasonally ponded areas for migratory waterfowl.

Where possible, the design should enhance habitat for native and endangered species. Effects on downstream water quality and temperature may be critical for some species.

This practice may adversely affect cultural resources. Planning, installation and maintenance must comply with GM 420, Part 401.

Operation safety of vehicle and farming equipment should be considered when selecting cut and fill slopes, especially where cropping or haying is planned.

PLANS AND SPECIFICATIONS

Plans and specifications for installing sediment and water control basins must conform to requirements of this standard and must describe requirements for applying the practice and achieving its intended purpose. *Plans should include the location of each water and sediment control basin in a field, a plan layout of the embankment and storage basin, the storage depths for runoff water and sediment, a profile of the embankment, a cross section of the embankment, and type of outlet. If protective vegetation is needed, the plans shall specify the recommended species, planting method, and fertilizer.*

OPERATION AND MAINTENANCE

A site specific O&M plan must be prepared for and reviewed with the landowner or

operator. The plan shall contain guidance to maintain the embankment, *sediment and* design capacity, vegetative cover and outlet.

All plans shall include a provision that after each large storm, basins *and outlets* must be inspected and needed maintenance performed. When sediment storage is full, accumulated sediment must be removed or the basin must be redesigned and modified to restore capacity.

Where designs include underground outlets, O&M plans should include checking for clogging and/or pipe damage.

Failures should be corrected as soon as possible to prevent major damages.

The sediment and design capacity shall be maintained by cleaning the basin. Excavated material spread on the cropland shall be placed to maintain fertility and enhance topography. The vegetation shall be maintained to prevent sheet and rill erosion or gullyng of the embankment. Trees and woody cover generally create problems on embankments and should be controlled.